

Engineering bacterial two-component system to construct novel malate sensing recombinant Escherichia coli

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In an attempt to develop a high throughput screening system for screening microorganisms which produce high amounts of malate, a MalKZ chimeric HK-based biosensor was constructed. Considering sequence the similarity among Escherichia coli MalK with Bacillus subtilis MalK and E. coli DcuS, the putative sensor domain of MalK was fused with the catalytic domain of EnvZ. The chimeric MalK/EnvZ (MalKZ) TCS induced the ompC promoter through the cognate response regulator, OmpR, in response to extracellular malate. Real-time quantitative PCR and GFP fluorescence studies showed increased ompC gene expression and GFP fluorescence as malate concentration increased. By using this strategy, various chimeric TCS based bacteria biosensors can be constructed, which may be used for the development of biochemical-producing recombinant microorganisms. This work was supported by a grant from the Next-Generation BioGreen 21 Program (SSAC, grant number: PJ011116) by RDA, and Basic Science Research Program by the Ministry of Education (NRF-2014R1A1A2054726).